



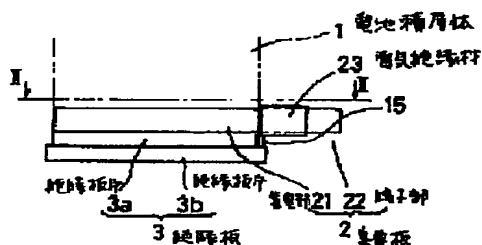
## PATENT ABSTRACTS OF JAPAN

(11) Publication number: **06060904 A**(43) Date of publication of application: **04.03.94**(51) Int. Cl. **H01M 8/24**(21) Application number: **04227932**(71) Applicant: **FUJI ELECTRIC CO LTD**(22) Date of filing: **04.08.92**(72) Inventor: **KONDO KO****(54) ELECTRIC INSULATING DEVICE FOR FUEL CELL****(57) Abstract:**

**PURPOSE:** To provide the electric insulating device of a fuel cell having good workability while maintaining a creepage distance between a current collecting plate and a terminal section at a low cost.

**CONSTITUTION:** An insulating plate 3 is constituted of two laminated thin insulating plate pieces 3a, 3b, and the insulating plate piece 3a kept in contact with a current collecting plate 2 is made nearly equal in size to the current collection section 21 of the current collecting plate 2. A gap 15 is formed between the terminal section 22 of the current collecting plate 2 and the insulating plate piece 3b, an electric insulating material 23 is fitted to the terminal section 22 by means of the gap 15, the cost is reduced while the creepage distance to the terminal section 22 is maintained, and workability is improved.

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**CLAIMS**

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[Claim(s)]

[Claim 1] In the fuel cell which attaches the collecting electrode plate which becomes the vertical end face of the cell layered product which comes to carry out the laminating of two or more cells from the current collection section and a terminal area, and consists of up-and-down bolting plates by binding tight on both sides of an electric insulating plate Electric insulation equipment of the fuel cell characterized by attaching electric insulation material in the terminal area of said collecting electrode plate while making into the almost same magnitude as the current collection section of said collecting electrode plate the piece of an electric insulating plate which constitutes said electric insulating plate from two or more thin pieces of an electric insulating plate by which the laminating was carried out, and touches said collecting electrode plate.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the electric insulation equipment with which the cell layered product of a fuel cell is insulated.

[0002]

[Description of the Prior Art] On both sides of the electrolyte, the cell which constitutes a fuel cell arranges an oxidizer electrode and a fuel electrode, and is constituted. Each cell cel is constituted by the separator which classifies the matrix and cell holding the phosphoric acid of the electrode which applied the platinum catalyst to the front face of a thin porosity carbon plate, and an electrolyte, and the cell layered product 1 is constituted by the laminating of these cells and the cooling plate inserted between them. In a fuel cell, fuel gas and oxidant gas are made to react and a generation of electrical energy is performed.

[0003] Drawing 3 is the block diagram of the cell layered product of a fuel cell. In drawing 3 , a collecting electrode plate 2 is attached in the vertical both-ends side of the cell layered product 1 which comes to carry out the laminating of the cell, and it binds tight on both sides of an electric insulating plate 3, and it binds tight and consists of plates 4. The collecting electrode plate 2 consists of the current collection section 21 and a terminal area 22. The bolting plate 4 is bound tight with the pressurization structural part 10 which consists of a tie rod 11, a pan spring 12, and a nut 13. Direct current voltage is taken out from the up-and-down collecting electrode plate 2. Drawing 4 is the IV direction view Fig. of drawing 3 , an electric insulating plate 3 has a dimension larger than the current collection section 21 of a collecting electrode plate 2, and the bolting plate 4 is bound tight with the tie rod 11 in four corners. The collecting electrode plate 2 is projected from the bolting plate 4.

[0004] Drawing 5 is the detail drawing of the collecting electrode plate of the cell layered product of drawing 3 . In drawing 5 , the collecting electrode plate 2 which consists of the current collection section 21 and a terminal area 22 is attached in the lower limit of the cell layered product 1, and the electric insulating plate 3 with a larger area than the current collection section 21 is inserted, and is bound tight with the bolting plate which is not illustrated. Then, the number of electric insulating plates 3 is one, and they form notching 14 in some electric insulating plates 3, and attach the electric insulation material 23 in the terminal area 22 of a collecting electrode plate, and are maintaining the creeping distance. Drawing 6 is the block diagram of the electric insulating plate of drawing 5 , (A) is the top view and (B) is the direction view Fig. of B of (A). The electric insulating plate 3 is equipped with the notching 14 aslant deleted at one edge, and it is made to have countered the electric insulation material 23 which this notching 14 attached in the collecting electrode plate 2 in drawing 6 .

[0005]

[Problem(s) to be Solved by the Invention] Since the electric insulation equipment of the conventional fuel cell was maintaining the creeping distance by consisting of an electric insulating plate of one sheet, cutting and lacking near the terminal area of a collecting electrode plate, and giving an electrical insulator to the terminal area of a collecting electrode plate, it was difficult for processing of notching 14 to take time and effort, and to attach the electric insulation material 23 in a terminal area 22, since between a collecting electrode plate 2 and electric insulating plates 3 is

narrow.

[0006] This invention aims at reducing cost and workability offering the electric insulation equipment of a good fuel cell, maintaining the creeping distance with the terminal area of a collecting electrode plate.

[0007]

[Means for Solving the Problem] In the fuel cell which attaches the collecting electrode plate which becomes the vertical end face of the cell layered product which comes to carry out the laminating of two or more cells from the current collection section and a terminal area, and consists of up-and-down bolting plates by binding tight on both sides of an electric insulating plate While making into the almost same magnitude as the current collection section of said collecting electrode plate the piece of an electric insulating plate which constitutes said electric insulating plate from two or more thin pieces of an electric insulating plate by which the laminating was carried out, and touches said collecting electrode plate, the above-mentioned purpose is attained by having attached electric insulation material in the edge of said collecting electrode plate.

[0008]

[Function] this invention -- getting twisted, while carrying out the laminating of two or more thin pieces of an electric insulating plate and constituting an electric insulating plate By having made into the almost same magnitude as the current collection section of a collecting electrode plate the piece of an electric insulating plate which touches a collecting electrode plate The clearance for board thickness between the pieces of an electric insulating plate is made between the terminal area of a collecting electrode plate, and an electric insulating plate, and the electric creeping distance can be maintained between the terminal areas of a collecting electrode plate by giving electric insulation material to the terminal area of a collecting electrode plate using this clearance.

[0009]

[Example] The block diagram of electric insulation equipment according [ drawing 1 ] to the example of this invention and drawing 2 are the II-II sectional views of drawing 1 . In drawing 1 , the same part as drawing 5 has attached the same sign. In this invention, piece of electric insulating plate 3a which constitutes an electric insulating plate 3 from thin pieces 3a and 3b of an electric insulating plate of two sheets by which the laminating was carried out, and touches a collecting electrode plate 2 was made into the almost same magnitude as the current collection section 21 of a collecting electrode plate 2, and other piece of electric insulating plate 3b was made larger than piece of electric insulating plate 3a. Between the terminal area 22 of a collecting electrode plate, and piece of electric insulating plate 3b, the clearance 15 for board thickness between piece of electric insulating plate 3a is made. The electric insulation material 41 is attached and kicked to the terminal area 22 of a collecting electrode plate using this clearance 15. Consequently, the electric creeping distance is maintainable between terminal areas 22 with the electric insulation material 41 and a clearance 15. Drawing 2 is the II-II sectional view of drawing 1 . In drawing 2 , the electric insulating plate 3 was constituted from pieces 3a and 3b of an electric insulating plate of two sheets, piece of electric insulating plate 3a which touches the current collection section 21 of a collecting electrode plate was made into the almost same magnitude as the current collection section 21 of a collecting electrode plate 2, and it miniaturized from other piece of electric insulating plate 3b.

[0010]

[Effect of the Invention] By having bound tight with the collecting electrode plate of a cell layered product, having constituted the insertion \*\*\*\*\* electric insulating plate from two or more pieces of an electric insulating plate by which the laminating was carried out between plates, and having made into the almost same magnitude as the current collection section of a collecting electrode plate the piece of an electric insulating plate which touches a collecting electrode plate in this invention By forming a clearance between the terminal area of a collecting electrode plate, and the piece of an electric insulating plate, and attaching electric insulation material in the terminal area of a collecting electrode plate using this clearance, with an easy configuration, cost can be reduced and the electric creeping distance can be maintained. And since electric insulation material can be easily attached in the terminal area of a collecting electrode plate, workability is raised.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the block diagram of the electric insulation equipment of the fuel cell by the example of this invention.

[Drawing 2] It is the direction sectional view of II-II of drawing 1.

[Drawing 3] It is the block diagram of the conventional cell layered product.

[Drawing 4] It is the IV direction view Fig. of drawing 3.

[Drawing 5] It is the block diagram of the electric insulation equipment of drawing 3.

[Drawing 6] In the block diagram of the electric insulating plate of drawing 5, (A) is the top view and (B) is the direction view Fig. of B of (A).

[Description of Notations]

- 1 Cell Layered Product
- 2 Collecting Electrode Plate
- 3 Electric Insulating Plate
- 3a The piece of an electric insulating plate
- 3b The piece of an electric insulating plate
- 4 Bolting Plate
- 10 Pressurization Structural Part
- 15 Clearance
- 21 Current Collection Section
- 22 Terminal Area
- 23 Electric Insulation Material

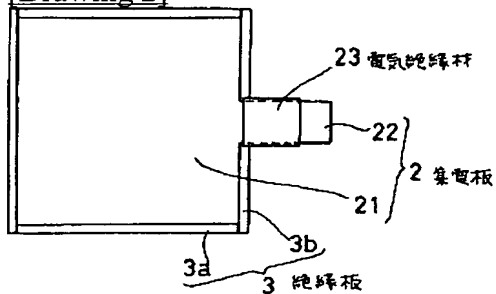
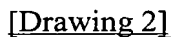
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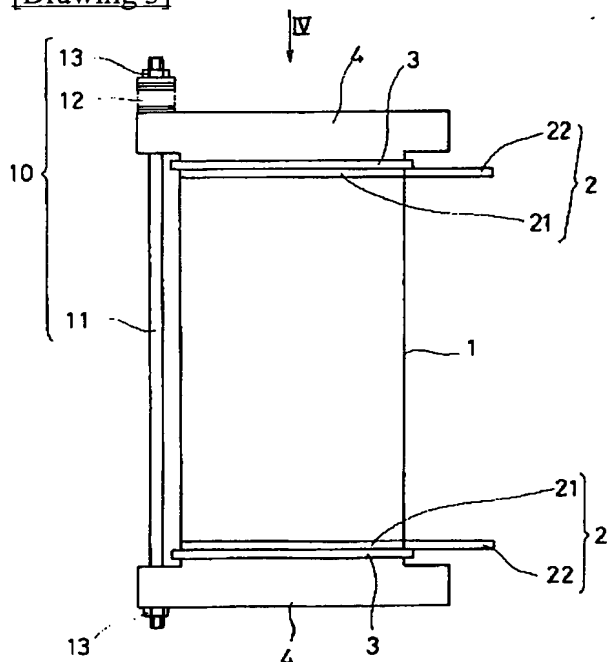
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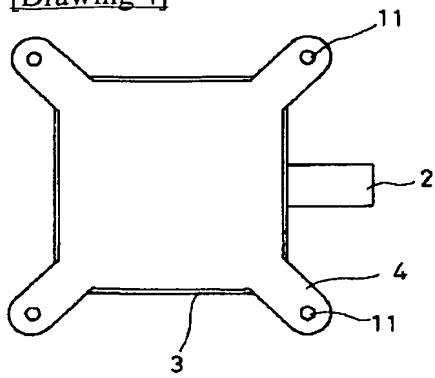
[Drawing 1]



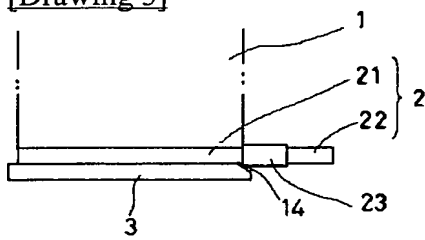
[Drawing 3]



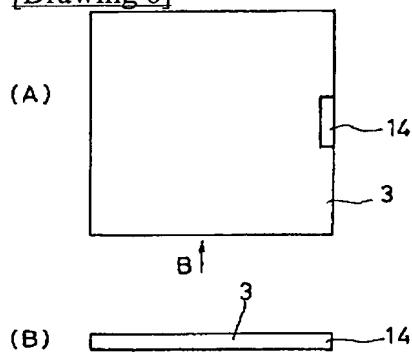
[Drawing 4]



[Drawing 5]



[Drawing 6]



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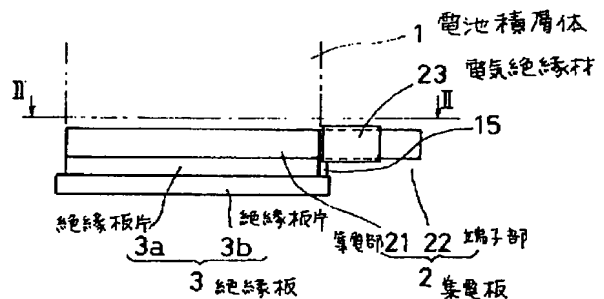
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(54) 【発明の名称】 燃料電池の電気絶縁装置

(57) 【要約】

【目的】 集電板の端子部との間に沿面距離を保ちつつコストを低減させ、かつ作業性が良い燃料電池の電気絶縁装置を得る。

【構成】 絶縁板 3 を 2 枚の積層された薄い絶縁板片 3 a, 3 b から構成し、かつ集電板 2 に接する絶縁板片 3 a を集電板 2 の集電部 2 1 とほぼ同じ大きさとする事により、集電板の端子部 2 2 と絶縁板片 3 b との間に隙間 1 5 を形成し、この隙間 1 5 を利用して端子部 2 2 に電気絶縁材 2 3 を取り付け、端子部 2 2 との沿面距離を保ちつつコストを低減させ、かつ作業性を向上させる。



## 【特許請求の範囲】

【請求項 1】複数の単電池を積層してなる電池積層体の上下端面に集電部と端子部とからなる集電板を取り付け、絶縁板を挟んで上下の締付け板で締付けて構成される燃料電池において、前記絶縁板を複数の積層された薄い絶縁板片から構成し、かつ前記集電板に接する絶縁板片を前記集電板の集電部とほぼ同じ大きさとするとともに、前記集電板の端子部に電気絶縁材を取り付けたことを特徴とする燃料電池の電気絶縁装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】この発明は、燃料電池の電池積層体を絶縁する電気絶縁装置に関する。

## 【0002】

【従来の技術】燃料電池を構成する単電池は電解質を挟んで酸化剤電極と燃料電極を配置して構成されている。各電池セルは、薄い多孔質カーボン板の表面に白金触媒を塗布した電極、電解質のリン酸を保持するマトリックス及び単電池を区分するセパレータにより構成され、電池積層体 1 はこれら単電池とその間に挿入された冷却板との積層により構成されている。燃料電池では燃料ガスと酸化剤ガスとを反応させて発電が行われる。

【0003】図 3 は燃料電池の電池積層体の構成図である。図 3 において、単電池を積層してなる電池積層体 1 の上下両端面に集電板 2 を取り付け、絶縁板 3 を挟んで締付け板 4 で締付けて構成される。集電板 2 は集電部 2 1 と端子部 2 2 とから構成されている。締付け板 4 はタイロッド 1 1、皿バネ 1 2、ナット 1 3 とからなる加圧構造部品 1 0 で締付けられる。上下の集電板 2 から直流電圧が取り出される。図 4 は図 3 の IV 方向矢視図で、絶縁板 3 は集電板 2 の集電部 2 1 より寸法が大きく、締付け板 4 は四隅をタイロッド 1 1 で締付けられている。集電板 2 は締付け板 4 から突出している。

【0004】図 5 は図 3 の電池積層体の集電板の詳細図である。図 5 において、電池積層体 1 の下端に集電部 2 1 と端子部 2 2 とからなる集電板 2 を取り付け、集電部 2 1 より面積が大きい絶縁板 3 を挟んで、図示しない締付け板で締付けている。そのとき、絶縁板 3 は 1 枚であり、絶縁板 3 の一部に切り欠き 1 4 を設け、かつ集電板の端子部 2 2 に電気絶縁材 2 3 を取り付けて、沿面距離を保っている。図 6 は図 5 の絶縁板の構成図で、(A) はその平面図、(B) は (A) の B 方向矢視図である。図 6 において、絶縁板 3 は一方の端部に斜めに削られた切り欠き 1 4 を備えていて、この切り欠き 1 4 が集電板 2 に取り付けられた電気絶縁材 2 3 に対向するようにしてある。

## 【0005】

【発明が解決しようとする課題】従来の燃料電池の電気絶縁装置は、1 枚の絶縁板からなり、集電板の端子部付近を切り欠いて、集電板の端子部に電気絶縁物を施すこ

とにより沿面距離を保っていたので、切り欠き 1 4 の加工に手間がかかり、かつ集電板 2 と絶縁板 3 との間が狭いため、端子部 2 2 に電気絶縁材 2 3 を取り付けることが困難であった。

【0006】この発明は、集電板の端子部との沿面距離を保ちつつコストを低減させ、かつ作業性が良い燃料電池の電気絶縁装置を提供することを目的とする。

## 【0007】

【課題を解決するための手段】複数の単電池を積層してなる電池積層体の上下端面に集電部と端子部とからなる集電板を取り付け、絶縁板を挟んで上下の締付け板で締付けて構成される燃料電池において、前記絶縁板を複数の積層された薄い絶縁板片から構成し、かつ前記集電板に接する絶縁板片を前記集電板の集電部とほぼ同じ大きさとするとともに、前記集電板の端子部に電気絶縁材を取り付けたことによって、上記目的を達成する。

## 【0008】

【作用】この発明によれば、複数の薄い絶縁板片を積層して絶縁板を構成するとともに、集電板に接する絶縁板片を集電板の集電部とほぼ同じ大きさとしたことにより、集電板の端子部と絶縁板との間に絶縁板片の板厚分の隙間ができて、この隙間を利用して集電板の端子部に電気絶縁材を施すことにより、集電板の端子部との間に電氣的な沿面距離を維持することができる。

## 【0009】

【実施例】図 1 はこの発明の実施例による電気絶縁装置の構成図、図 2 は図 1 の II-II 断面図である。図 1 において、図 5 と同じ部位は同じ符号を付してある。この発明においては、積層された 2 枚の薄い絶縁板片 3 a、3 b から絶縁板 3 を構成し、かつ集電板 2 に接する絶縁板片 3 a を集電板 2 の集電部 2 1 とほぼ同じ大きさとし、他の絶縁板片 3 b は絶縁板片 3 a より大きくした。集電板の端子部 2 2 と絶縁板片 3 b との間に、絶縁板片 3 a の板厚分の隙間 1 5 ができる。この隙間 1 5 を利用して集電板の端子部 2 2 に電気絶縁材 4 1 を取り付ける。その結果、電気絶縁材 4 1 と隙間 1 5 とにより、端子部 2 2 との間に電氣的な沿面距離を維持することができる。図 2 は図 1 の II-II 断面図である。図 2 において、絶縁板 3 を 2 枚の絶縁板片 3 a と 3 b とから構成し、集電板の集電部 2 1 に接する絶縁板片 3 a を集電板 2 の集電部 2 1 とほぼ同じ大きさとし、他の絶縁板片 3 b より小型化した。

## 【0010】

【発明の効果】この発明においては、電池積層体の集電板と締付け板との間に挿入さる絶縁板を、複数の積層された絶縁板片から構成し、集電板に接する絶縁板片を集電板の集電部とほぼ同じ大きさとしたことにより、集電板の端子部と絶縁板片との間に隙間を形成し、この隙間を利用して集電板の端子部に電気絶縁材を取り付けることにより、簡単な構成で、コストを低減させ、電氣的

3

沿面距離を保つことができる。しかも集電板の端子部へ容易に電気絶縁材を取り付けることができるので、作業性を向上させる。

【図面の簡単な説明】

【図1】 この発明の実施例による燃料電池の電気絶縁装置の構成図である。

【図2】 図1のII-II方向断面図である。

【図3】 従来の電池積層体の構成図である。

【図4】 図3のIV方向矢視図である。

【図5】 図3の電気絶縁装置の構成図である。

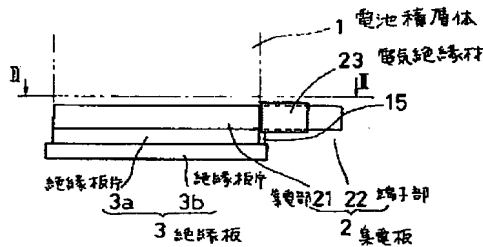
【図6】 図5の絶縁板の構成図で、(A)はその平面図、(B)は(A)のB方向矢視図である。

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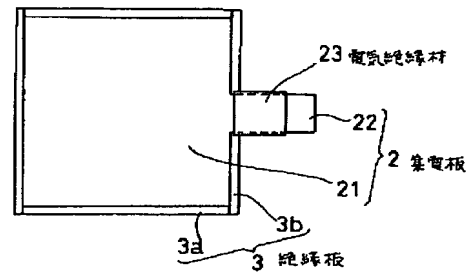
【符号の説明】

- 1 電池積層体
- 2 集電板
- 3 絶縁板
- 3 a 絶縁板片
- 3 b 絶縁板片
- 4 締付け板
- 10 加圧構造部品
- 15 隙間
- 21 集電部
- 22 端子部
- 23 電気絶縁材

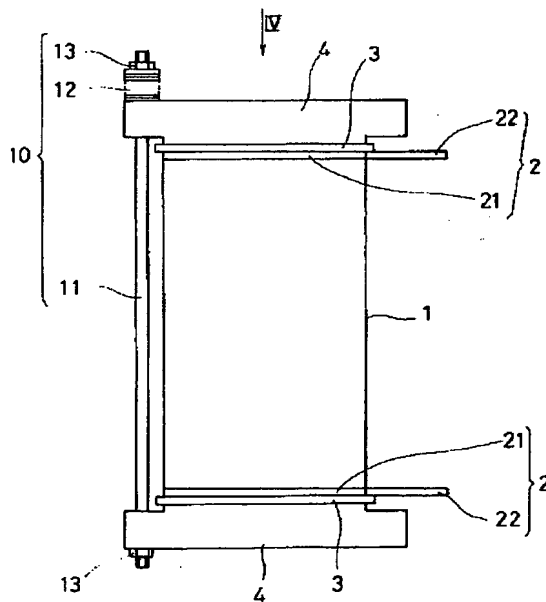
【図1】



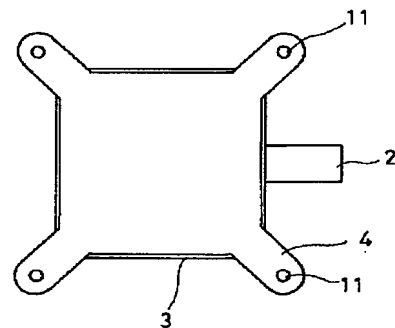
【図2】



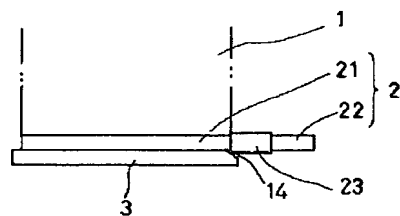
【図3】



【図4】



【図5】



【図 6】

